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To: Assistant Commissioner for Patents  
Washington, D. C. 20231

NEW APPLICATION TRANSMITTAL

Sir:

1. Transmitted herewith for filing is the utility patent application of:

Inventors: Kenneth Harrenstien, Kamal Ahluwalia and David Kucharczyk

For: DATA COMMUNICATION PROTOCOLS FOR A MOBILE-BASED CLIENT-SERVER SYSTEM OVER A  
WIRELESS NETWORK

2. Type of Application:

- ☒ Original  
☐ Design  
☐ Plant  
☐ Divisional  
☐ Continuation of U.S. Serial No. \_\_\_\_\_ filed on \_\_\_\_\_  
☐ Continuation-in-part

3. Enclosed are:

- ☒ 18 page(s) specification; 7 page(s) claims; 1 page(s) abstract  
☒ 3 sheets of drawing (☒ informal ☐ formal)  
☒ Declaration and Power of Attorney (☒ combined ☐ separate)  
☒ Assignment of the invention to: Oracle Corporation  
☒ Assignment recordation cover sheet  
☒ Power of Attorney

CERTIFICATE OF MAILING (37 CFR 1.10)

I hereby certify that this New Application Transmittal along with any paper referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below in an envelop as "Express Mail Post Office to Addressee" addressed to the: Assistant Commissioner for Patents, Washington, D.C. 20231.

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Date of Mailing: July 10, 1997

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(Signature of person mailing paper)

4. Filing Fees

The filing fee has been calculated as shown below:

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-Statutory Basic Filing Fee	(\$770.00)	\$ 770.00
-Total Claims <u>23</u> - 20 = <u>3</u> x \$22		\$ 66.00
-Independent Claims <u>5</u> - 3 = <u>2</u> x \$80		\$ 180.00
-Multiple Dependent Claim(s)	(\$260)	\$ 0.00
-Surcharge 37 CFR 1.16(e) (\$130)		\$
TOTAL OF ABOVE CALCULATIONS .....		\$ 0.00
-Reduction for Small Entity (1/2)		\$ 0.00
-Assignment (\$40)		\$ 40.00
TOTAL FEES .....		\$1036.00

\*\*\*\*\*

X Check No. 42255 in the amount of \$1036.00 is enclosed to cover the total fees of \$1036.00.

       This application is filed without fee or declaration pursuant to 37 CFR 1.53.

5. AUTHORIZATION TO CHARGE ADDITIONAL FEES

X The Commissioner is hereby authorized to charge the following additional fees by this paper and during the entire pendency of this application to Deposit Account No. 12-2475:

<u>      </u>	37 CFR 1.16 (filing fees)
<u>X</u>	37 CFR 1.16 (presentation of extra claims)
<u>      </u>	37 CFR 1.16(e) (surcharge for filing the basic filing fee and/or declaration on a date later than the filing date of the application)
<u>X</u>	37 CFR 1.17 (application processing fees)
<u>      </u>	37 CFR 1.18 (issue fee at or before mailing of Notice of Allowance, pursuant to 37 CFR 1.311(b))

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Date: July 10, 1997

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S P E C I F I C A T I O N

**DATA COMMUNICATION PROTOCOLS FOR A MOBILE-BASED  
CLIENT-SERVER SYSTEM OVER A WIRELESS NETWORK**

Field of Invention

5           The present invention pertains to mobile-based client-server systems, including methods and protocols for establishing and maintaining data communications between a server and a mobile-based client station over a wireless network.

Background

10           In conventional client-server systems, respective "client stations" (e.g., computer terminals having one or more client applications) must periodically obtain information from a server (e.g., a centralized computer system operating in conjunction with one or more databases). In this relationship, the server  
15           may be passive -- i.e., where the server is configured to respond to specific requests from respective client stations but does not otherwise initiate communication -- or active, i.e., where the server is configured to periodically transmit information to one or more client stations, regardless of whether a specific request  
20           has been made. An active server configuration may be especially useful in situations where the server receives updated information from an outside source that is important for a client

station to receive immediately, e.g., changes in product pricing, inventory amounts, sales orders, reservations, stock prices, etc.

Client-server systems have conventionally been restricted to high speed, hard-wired networks -- e.g., coaxial, twisted pair, optical fiber. More recently, however, client-server systems have also incorporated "mobile" client stations that are not hard-wired to a high speed network, e.g., such as portable (i.e., laptop) computers equipped with modems for connecting to the server via a dial-up, circuit-switched connection. "Wireless" modems and networks may also be employed to provide remote connectivity of client stations to a server over a wireless communication network, thereby allowing far greater mobility on the part of the client station.

In particular, as used herein, a "mobile-based" client-server system refers to a system having a server configured to periodically communicate with one or more mobile-based client stations over a wireless communication network. It should be noted that the term "mobile-based" does not necessarily preclude the existence of one or more client stations with hard-wired connections to the server as part of the same system, but only requires that the system support at least one mobile-based client station, as well.

An exemplary architecture for a mobile-based client-server system is set forth in commonly assigned U.S. patent application Serial No. 08/521,660, filed August 31, 1995, entitled "A Mobile-

Based Client-Server System," which is assigned to the assignee of the present invention and which is fully incorporated herein by reference. As described therein, an "agent" is used in conjunction with a mobile-based client-server system, wherein the agent is coupled to the respective client stations through a wireless communication link. When a client station requests information from the server, the agent receives the request and handles the interaction with the server on behalf of, and independent of, the client station. Once the requested information is received by the agent, it can be transferred to the requesting client station in a manner which efficiently utilizes over-the-air ("OTA") bandwidth of the wireless communication link, independent of the server, i.e., such that the client station and the agent operate synchronously.

More particularly, in order to request and receive information from the server, a mobile-based client station must first establish a wireless communication link with the server (i.e., via the agent). After making the request, the client station must then maintain the communication link until such time as the server is able to gather and successfully transmit the requested information back to the client station. In situations where the server must itself obtain some or all of the information from a still further remote entity, this "download" process can take considerable time and, in view of the relatively high cost of maintaining a wireless communication link, expense.

This situation is especially problematic in an "active" client-server system, since the server can only transmit information to a respective client station when a communication link is established. Thus, to ensure it receives all pertinent information from the server as early as possible, a mobile-based client station would have to maintain a constant communication link with the server, which can be cost prohibitive -- i.e., especially considering the potentially significant amount of "wasted" time spent while the client station is merely standing by, waiting to receive information from server. Alternatively, the client station may miss receiving updated information from the server, until such time as a communication link is eventually established for some other purpose.

In the alternative, a "polling" scheme may be employed by the client stations to determine whether there is any data on the server that is to be accessed. Essentially, this scheme requires a respective client station to periodically establish a communication link with the server to check for any waiting data or messages. If there are messages or data waiting to be downloaded, then the client will retrieve the information at that time. If there are no messages or data waiting, then the client will merely disconnect the communication link (i.e., "log off").

Even with a polling scheme, however, a notable amount of time and resources are consumed each time a remote connection is established from the client station to the server, whether or not

there is any data waiting to be downloaded. In particular, each time an OTA connection is made, time and resources are consumed to set up and tear down the communication link. In other words, the client station must incur a fair amount of connection time and expense each time it checks the server for waiting data. Further, as the polling rate increases, the lost connection time and expense also increases.

Thus, it is would be desirable to provide methods and protocols for establishing and maintaining data communications between a server and a mobile-based client station over a wireless communication network, wherein a client station is automatically notified whenever information is waiting for it at the server, so that the client station may only then need to establish a communication link with the server in order to receive the information. In this manner, a mobile-based client station can receive information from a server on a nearly real-time basis, without having to maintain a constant wireless communication link, or employ a still costly polling scheme.

SUMMARY OF THE INVENTION

The present invention provides a mobile-based client-server system that allows for the efficient transfer of information from a server to a mobile client station via a wireless network.

5        In a preferred embodiment, a client station in a mobile-based client-server system is adapted for communication with a respective GSM-based wireless communication transceiver ("client station transceiver"), e.g., by a communication port configured for connecting to a GSM-based wireless telephone set. A  
10        centralized server that periodically receives or otherwise generates information to be delivered to the client station is connected, via a GSM-based wireless communication network, to an associated transceiver (i.e., "server transceiver"). Upon  
15        receiving or generating a selected threshold of information to be delivered to the client station, the server generates a signal containing a telephonic address of the client station and a message (e.g., alpha, numeric, binary, or some combination thereof) indicating that the server has information waiting for the client station. The server relays the signal to the GSM  
20        transceiver, which then transmits the message to the client station transceiver in the form of a wireless communication page, based on the telephonic address.

In particular, by way of a presently preferred example, the server transceiver employs a GSM-based short message service



("SMS"), which allows users to send and receive point-to-point alphanumeric messages up to a certain byte limit.

If the client station is connected to its transceiver, the message from the server is immediately received by the client station, which is thereby notified of the waiting information. In particular, the message will preferably (at least) identify both the type and quantity of information waiting at the server for the respective client station. If the information type and/or quantity meet selected thresholds of the client station, it then establishes a wireless OTA connection to server (i.e., via the respective client station and server transceivers), and the waiting information is then transferred from the server to the client station.

If the client station is not connected to its transceiver, receipt of the message from the server is preferably detected by a user of the client station (i.e., by an audible ring or mechanical vibration), who can then connect the transceiver to the client station so that it may receive and analyze the message. Alternately, the message may be viewed by the user on a display screen provided with the transceiver, wherein the user can then decide whether to establish a communication link between the client station and the server.

In either event, once a communication link is established, other information may also be exchanged between the server and client station -- i.e., which was not otherwise a high enough

priority to justify the cost of making and maintaining a wireless connection.

In accordance with a general aspect of the invention, full advantage may be taken of the intelligent paging services built into GMS-based SMS paging service. Thus, the server can be configured to provide extensive information about the type, quantity, and importance of the information waiting at the server. Intelligent filtering options can be employed at the server, client station, or both. By way of example, a filter can be set to activate the SMS paging notification of a client station only if certain types or quantities of information are waiting at the server. Likewise, a filter can be set at a respective client station so that a responsive wireless communication link is only established if selected information type or quantity thresholds are waiting at the server.

In alternate preferred embodiments, the paging activities may be controlled by the server itself, or by a specific application on the server.

As will be apparent to those skilled in the art, other and further objects and advantages will appear hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

The drawings illustrate both the design and utility of preferred embodiments of the present invention, in which:

FIG. 1 is a simplified block diagram of an exemplary mobile-based client-server system, including a centralized server and a plurality of mobile-based client stations;

FIG. 2 is a flow chart depicting a preferred protocol at the server for the transmission of information to and from a selected client station; and

FIG. 3 is a flow chart depicting a preferred protocol at the client station for the transmission of information from and to the server.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1, an exemplary mobile-based client-server system 20 includes a server 22 that operates in conjunction with at least one and preferably a plurality of data bases 24. The server 22 may also be linked to multiple further servers (not shown) and data sources (also not shown) via a local or wide area network ("LAN" or "WAN") 26. In this manner, the server 22 (as well as any application programs residing thereon) may access any number of applications and stored information available through the network 26. The server 22 is connected to an associated communication transceiver 28 via a GSM-based wireless network 27 for communicating with a plurality of mobile client stations 30, which may comprise, e.g., suitable data terminals, laptop computers, or PDAs, etc.

As will be appreciated by those skilled in the art, the particular communication transceiver 28 associated with the server 22 may be any one of many transceivers available via the communication network 27, e.g., on a reserved, or dial-up basis. For purposes of ease in illustration, however, a single "server transceiver" 28 will be referred to in conjunction with the remaining detailed description.

Each mobile client station 30 is preferably connected to its own respective GSM-based wireless network transceiver 32, wherein a communication link between the server 22 and the respective client station 30 may be established via the respective server

and client station transceivers 28 and 32. A particular advantage of employing GSM (i.e., "Global System for Mobile Communications") based transceivers 28 and 32 is that no additional modem is required at the server and client stations 22 and 30. Instead, data can be transmitted and received directly through the respective GSM-based transceivers 28 and 32 -- e.g., which may each consist of a respective mobile telephone set configured with a data communication port.

Generally, the client stations 30, including one or more residing application programs, periodically receive and transmit information from and to the server 22. In the case where information is to be sent from a client station 30 to the server 22 (e.g., a data retrieval request), the client station causes a wireless communication link to be established between the client station GSM transceiver 32 and the server GSM transceiver 28 -- i.e., via an agent also residing on the respective client station 30 -- and then transmits the respective information to the server 22. In certain cases, the client station may maintain the wireless communication link until responsive information is received back from the server 22. Otherwise, or at such time as the given information exchange is completed, the communication link is terminated.

In situations where the server 22 generates or otherwise receives information intended for a client station 30, the server 22 generates a signal containing a telephonic address of the

client station 30 and a message indicating that the server 22 has information waiting for the client station 30, and relays this message to its associated GSM transceiver 28. The server transceiver 28 then transmits the message to the respective client station transceiver 32 via a wireless communication page based on the telephonic address.

In particular, the server transceiver 28 preferably employs a GSM-based short message service ("SMS") to send the message page to the client station transceiver 32, which allows users to send and receive point-to-point messages containing up to a few tens of bytes limit. SMS paging is similar to conventional paging services, but much more comprehensive, allowing bidirectional messages, store-and-forward delivery, and acknowledgment of successful delivery. The message preferably includes (at least) both the type and quantity of information awaiting delivery to the identified client station. By way of example only, an SMS paging message from the server 22 may contain a first field for identifying the type of information (e.g., "e-mail") and a second field indicating the quantity (e.g., "56 Mbytes") waiting for a specified client station 30.

Preferably, the paging message transmits the information type and quantity fields in both numeric form, so that the message can be interpreted both directly by the client station 30, and alpha form, so that the message may be interpreted by a user of the client station 30. In particular, if the client

station 30 is not connected to its transceiver 32, receipt of an message transmitted from the server 22 is preferably still detected by a user of the client station 30, e.g., by an audible ring or mechanical vibration of the client station transceiver 32. The user could then either connect the transceiver 32 to the client station 32 so that the later may receive and analyze the message, or, alternately, the message may be viewed by the user on a display screen 33 provided with the transceiver 32, wherein the user can then decide whether to establish a communication link between the client station 30 and the server 22.

A more detailed description of a preferred communication protocol for the transmission of information between the server 22 and a specified client station 30 is provided in conjunction with the flow charts set forth in FIGS. 2 and 3.

Referring to FIG. 2, when an exemplary block of information 40 intended for a given client station 30 is first received, or otherwise generated, by the server 22, the server 22 performs a first look-up 42 to verify that the respective client station 30 has been selected to be notified of pending information, e.g., by comparing a client station address ("CSID.") associated with the information 40 against those stored in a respective memory table (not shown). The server 22 then performs a second look-up 44 to verify that the type (i.e., nature) of the pending information 40 is of a selected type that the respective client station 30 is to be notified of. Finally, the server 22 performs a third look-up

46 to verify that the size (or quantity) of the pending  
information 40 (i.e., byte size) is sufficient to justify  
notification of the respective client station 30. If any of  
these respective verifications 42, 44 or 46 fail, the server 22  
5 takes no further action, but preferably saves the information 40  
in a memory space (not shown) associated with the respective  
client station 30.

If all of the verifications 42, 44 and 46 are "yes," the  
server 22 generates a message 48 to send to the respective client  
station 30, which preferably includes (at least) the CSID of the  
information, along with the type and size. A stored telephone  
number 50 of the transceiver 32 associated with the respective  
client station 30 is appended to the message to form a paging  
signal 51, which is then sent to the server transceiver 28. The  
10 server transceiver 28 will then send an SMS page (not shown in  
FIG. 2) to the respective client station 30, based on the  
respective telephone number 50.  
15

Notably, any or all of the respective CSID, type, and  
quantity verifications 42, 44 and 46 may preferably be by-passed  
20 (i.e., "turned off"), e.g., by a system operator or  
administrator. Further, as will be appreciated by those skilled  
in the art, the particular order of the respective CSID, type,  
and quantity verifications 42, 44 and 46 is not significant,  
i.e., any order may be employed. Still further, other types or



combinations of filtering verifications may be employed in alternate embodiments.

In particular, the intelligent filtering of outgoing messages is preferably extensible, wherein various desired filtering options may be configured and applied (e.g., including particular thresholds for each filter) on a client station by client station basis. Thus, the aforescribed filtering verifications illustrated in FIG. 2 are provided for purposes of non-limiting illustration of the inventive concepts described herein.

Moreover, in a presently preferred embodiment, the server may be configured on a client station-by-client station basis, such that an SMS page is only made to selected client stations, and only then if certain types and/or quantities of information is waiting to be transferred.

Referring to FIG. 3, when a respective SMS paging message is received by a client station 30 from its associated transceiver 32, it performs a similar set of filtering verifications on the received message 52. In particular, the CSID of the received message 52 is verified 54, to ensure the proper client station (30) has been sent the paging message 52. The respective client station 30 verifies that the identified pending information (40) waiting for it at the server is of a selected type 56 and quantity 58 that justify the cost of establishing a wireless communication link in order to

immediately retrieve the information (40). If any of these respective verifications 54, 56 or 58 fail, the client station 30 takes no further action with respect to the received message 52.

If, however, all of the verifications 54, 56 and 58 are "yes," the client station 30 issues an instruction 60 to its associated transceiver 32 to establish a communication link with the server transceiver 28, whereby the client station 30 thereafter "logs-in" with the server 22.

Once a log-on/communication link 62 is established between the respective client station 30 and server 22, the client station 30 transmits a request 64 to the server 22 for the pending information (40). After receiving the pending information 66, the client station 30 may then utilize the now-established communication link 62 for conducting further exchanges of information with the server 22. From a flow protocol point of view, the client station 30 first polls 68 its resident applications to inquire whether further information exchange transactions 72 with the server 22 are desired. If none are desired, then the client station 30 logs-off 70 from the server 22 and the communication link is discontinued. If there are one or more desired further transactions 72, each is carried out, wherein the same inquiry 68 is made of the resident applications after each respective transaction 72 is completed, until there are no further desired transactions and the log-off/disconnect 70 is performed.

As at the server end, any or all of the respective CSID, type, and quantity verifications 54, 56 and 58 of received messages at the client station 30 may preferably be by-passed (i.e., "turned off") by a client station user (or remotely by a system operator or administrator). Further, as will be appreciated by those skilled in the art, the particular order of the respective CSID, type, and quantity verifications 54, 56 and 58 is not significant, i.e., any order may be employed. Still further, other types or combinations of filtering verifications may be employed in alternate embodiments.

In particular, the intelligent filtering of received messages is preferably extensible, wherein various desired filtering options may be configured and applied on a client station by client station basis, wherein the particular thresholds for each filter are preferably set by the respective client station users. Thus, the aforescribed filtering verifications of received messages illustrated in FIG. 3 are provided for purposes of non-limiting illustration of the inventive concepts described herein.

While embodiments and applications of this invention have been shown and described, as would be apparent to those skilled in the art, many more modifications and applications are possible without departing from the inventive concepts herein.

For example, many other types of communication networks other than a wireless network may be employed for providing

connectivity between the client station and server following the paging notification of the client station by the server seeking to transmit information. By way of illustration, in an alternate preferred embodiment, upon receiving a paging notification from the server and determining that the pending information is of a sufficient type and quantity to justify the costs of establishing a connection to transfer the information, the client station may execute a dial-up connection over a local telephone network in order to reach the server.

In particular, the advantages of the present invention may be gained in a variety of client-server network architectures, including those spanning conventional (i.e., wired or optical) networks, wherever the continuous or polled connection between server and client station is impossible or otherwise impractical, e.g., where transmission set-up costs are a factor in deciding whether a transfer of information should occur between a server and a respective client station.

Thus, the scope of the disclosed inventions is not to be restricted except in the spirit of the appended claims.

What is claimed:

1           1.    A method for transmitting information from a server to  
2   a client station in a mobile-based client-server system,  
3   comprising the steps of:

4           determining that the server has information to be  
5   transmitted to client station; and

6           transmitting a message from a transceiver associated with  
7   the server to a transceiver associated with the client station,  
8   the message indicating that the server has information for the  
9   client station.

1           2.    The method of claim 1, comprising the further step of:  
2           establishing a connection between the client station and  
3   server in response to a received message.

1           3.    The method of claim 2, wherein the connection between  
2   the client station and server is established via the respective  
3   client station and server transceivers.

1           4.    The method of claim 1, wherein the message indicates  
2   the type of information to be transmitted to the client station.

1           5.    The method of claim 4, comprising the further step of:  
2           evaluating a received message at the client station to  
3           determine whether the information is of a selected type.

1           6.    The method of claim 1, wherein the message indicates  
2           the quantity of information to be transmitted to the client  
3           station.

1           7.    The method of claim 1, wherein the respective client  
2           station and server transceivers are GSM-based transceivers.

1           8.    The method of claim 7, wherein the server transceiver  
2           sends the message to the client station transceiver in the form  
3           of an SMS paging message.

1           9.    A method for transmitting information from a server to  
2           a client station in a mobile-based client-server system,  
3           comprising the steps of:

4           evaluating information at the server to determine whether  
5           the information is of a selected type; and

6           transmitting a message from a transceiver associated with  
7           the server to a transceiver associated with the client station if  
8           the information is of a selected type, the message indicating the  
9           server has information for the client station.

1           10. The method of claim 9, comprising the further step of  
2           prior to transmitting the message, evaluating the  
3           information at the server to determine whether the information is  
4           of a selected quantity.

1           11. The method of claim 9, comprising the further steps of:  
2           evaluating a received message at the client station to  
3           determine whether the information is of a selected type; and  
4           establishing a connection between the client station and  
5           server in response to a received message if the information is of  
6           a selected type.

1           12. The method of claim 9, comprising the further steps of:  
2           evaluating a received message at the client station to  
3           determine whether the information is of a selected quantity; and  
4           establishing a connection between the client station and  
5           server in response to a received message if the information is of  
6           a selected quantity.

1           13. A machine readable medium having stored thereon a  
2 program for causing a server having information to be transmitted  
3 to a client station to perform the steps of:

4           generating a signal containing a telephonic address of a  
5 transceiver associated with the client station and a message  
6 indicating that the server has information for the client  
7 station; and

8           transmitting the signal to a transceiver associated with the  
9 server, the server transceiver configured to send the message to  
10 the client station transceiver based on the telephonic address.

1           14. The machine readable medium of claim 13, the stored  
2 program causing the server to perform the additional step of:

3           determining whether the information is of a type requiring  
4 that the client station be notified.

1           15. The machine readable medium of claim 13, the stored  
2 program causing the server to perform the additional step of:

3           determining whether the information is of a quantity  
4 requiring that the client station be notified.



1           16. A machine readable medium having stored thereon a  
2 program for adapting a client station to receive and process  
3 messages transmitted from a server via a wireless network  
4 connection, and for causing the client station to perform the  
5 steps of:

6           evaluating a received message to determine whether the  
7 server has a selected type and quantity of information waiting  
8 for the client station;

9           generating a signal containing a telephonic address of a  
10 communication transceiver associated with the server and  
11 instructions for establishing a log-on connection with the server  
12 if the server has a selected type and quantity of information  
13 waiting for the client station; and

14           transmitting the signal to a transceiver associated with the  
15 client station, the client station transceiver configured to  
16 establish a communication link with the server transceiver based  
17 on the telephonic address.

1           17. The machine readable medium of claim 16, the stored  
2 program causing the client station to perform the additional  
3 steps of:

4           transmitting a first request for the information to the  
5 server via the established communication link;

6           receiving the requested information; and

7           transmitting additional information to the server via the  
8           established communication link.

1           18. The machine readable medium of claim 17, wherein the  
2           additional information comprises a further data request.

1           19. A mobile-based client-server system, comprising:  
2           a client station adapted for communication with an  
3           associated client station transceiver; and

4           a server configured to periodically receive or generate  
5           information to be delivered to the client station, the server  
6           linked to an associated server transceiver, wherein

7           the server is further configured to transmit a message to  
8           the client station via the respective server and client station  
9           transceivers upon receiving or generating a selected threshold of  
10          information to be delivered to the client station.

1           20. The mobile-based client-server system of claim 19,  
2           wherein the message indicates both the type and quantity of  
3           information to be transmitted to the client station.

1           21. The mobile-based client-server system of claim 19,  
2 wherein the respective client station and server transceivers are  
3 GSM-based transceivers, and wherein the server transceiver sends  
4 the message to the client station transceiver in the form of an  
5 SMS paging message.

1           22. The mobile-based client-server system of claim 19,  
2 wherein the client station is configured to evaluate received  
3 messages received to determine whether the server has selected  
4 type and quantity of information waiting for the client station.

1           23. The mobile-based client-server system of claim 22,  
2 wherein the client station is further configured to establish a  
3 log-on connection with the server via the respective client  
4 station and server transceivers if a received message indicates  
5 the server has a selected type and quantity of information  
6 waiting for the client station.

ABSTRACT

Intelligent paging services provided by a GSM-based mobile communication network are employed in a mobile-based client-server system to provide automatic notification of a mobile client station of the type and quantity of information awaiting delivery to a mobile client station at a centralized server, so that the client station may then establish a communication link to receive the information, without otherwise requiring a costly polling scheme. In a preferred embodiment, the server evaluates received or otherwise generated information that is intended for a respective client station to determine whether the information is of a selected type and/or quantity requiring notification of the client station. If so, the server transmits a message (e.g., alpha-numeric) from a transceiver associated with the server to a transceiver associated with the client station, the message indicating the type and quantity of information awaiting delivery to the client station. The respective client station evaluates the received message and, if the specified information type and quantity justify the time and expense, establishes a log-on connection with the server via the respective client station and server transceivers in order to receive the information and, if expedient, conduct further information exchanges.

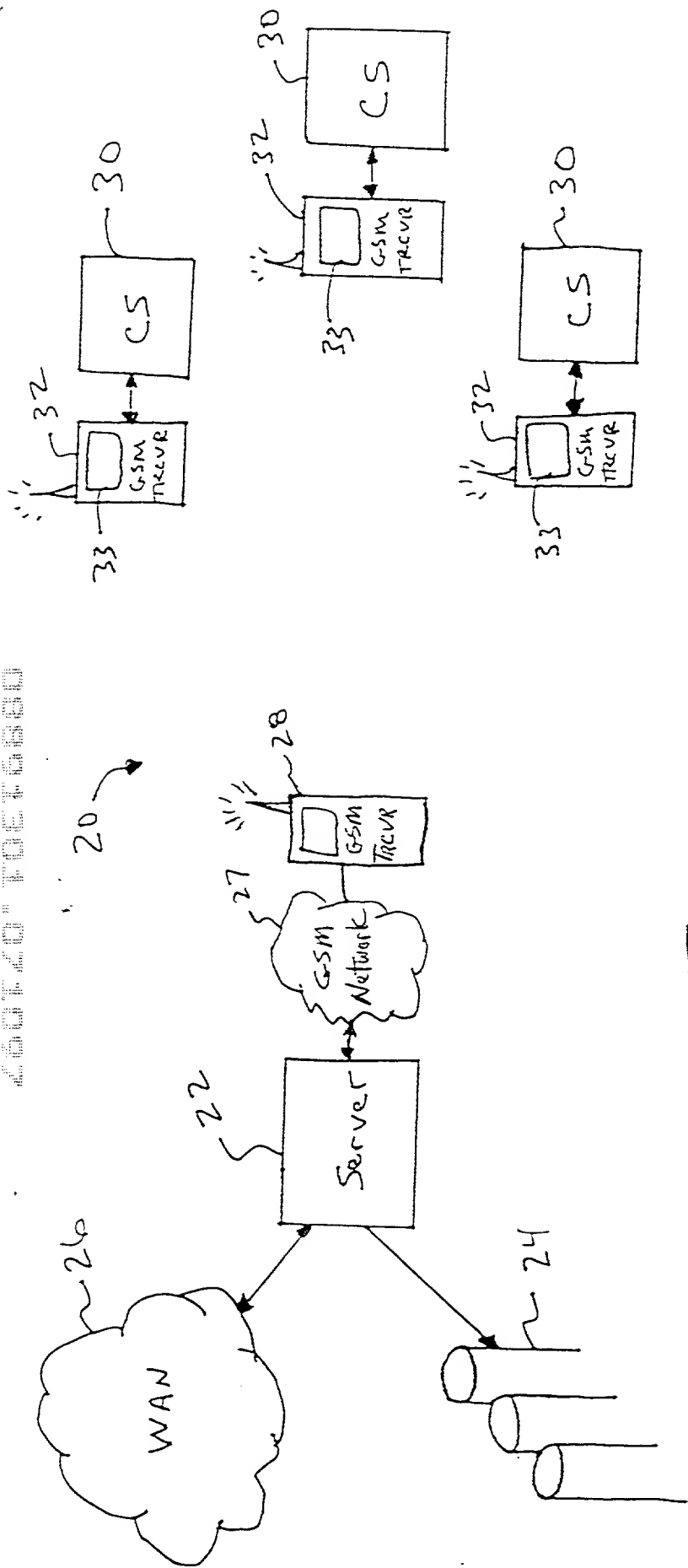


Fig. 1

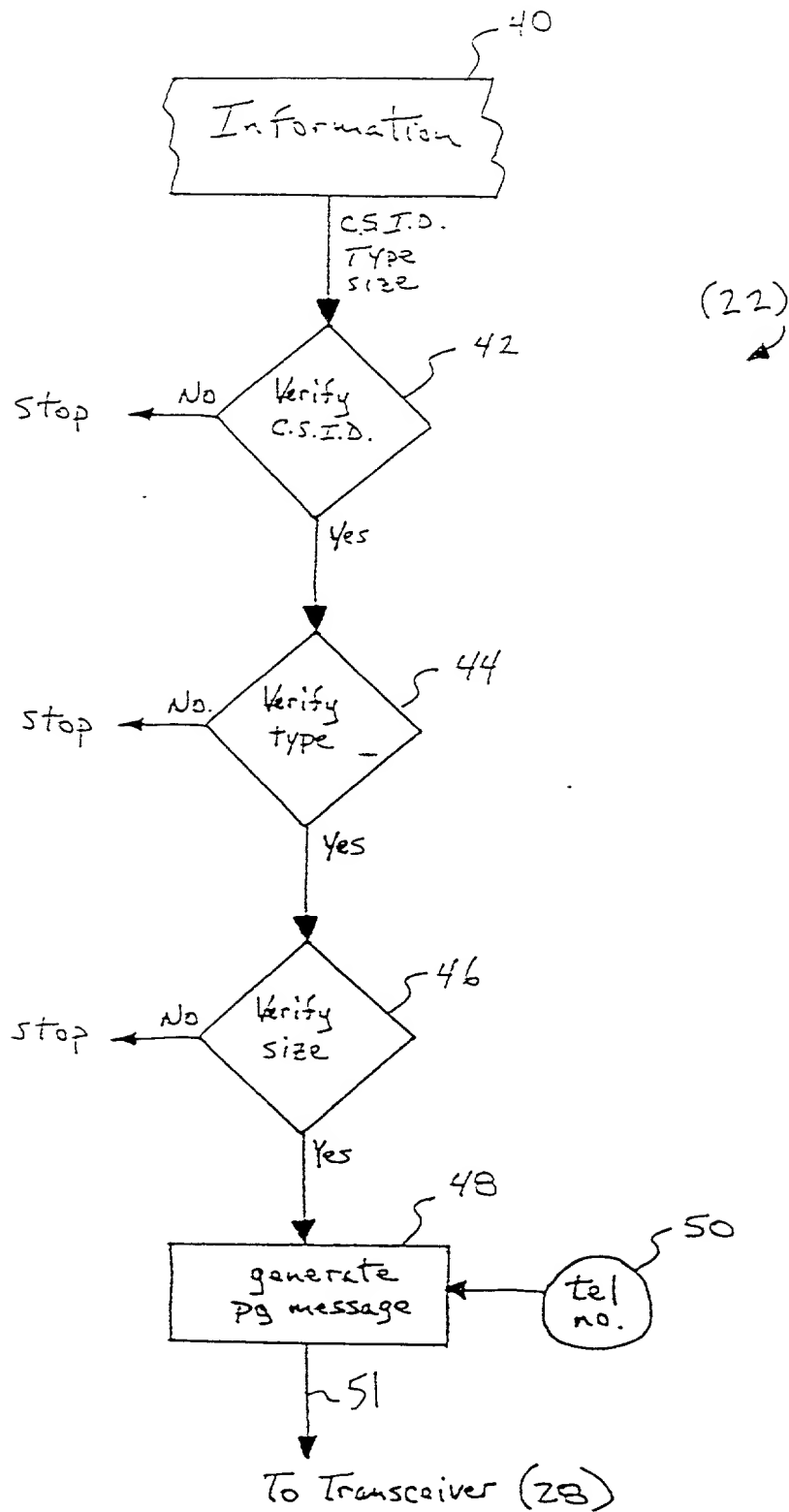


Fig. 2

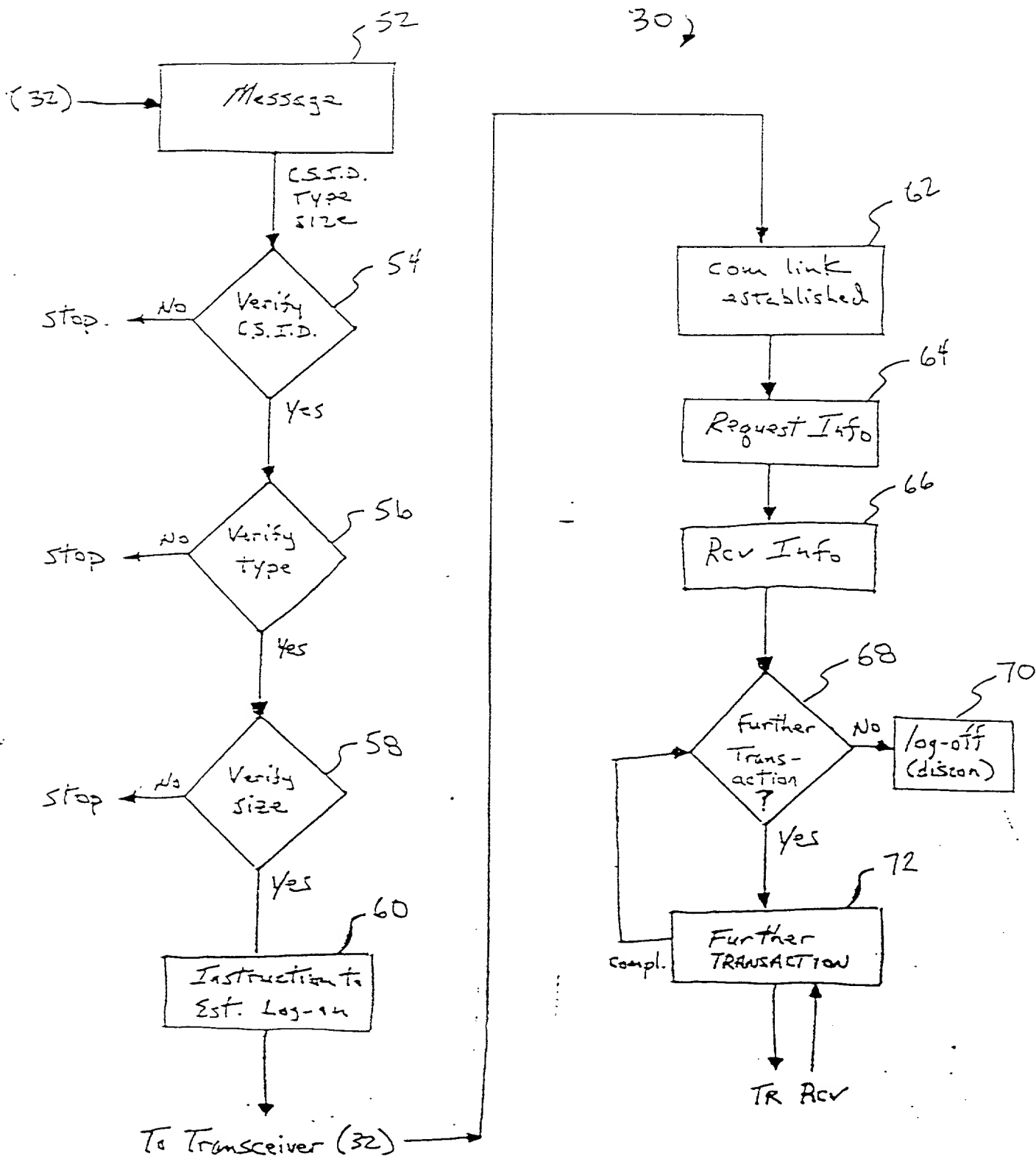


Fig. 3

# POWER OF ATTORNEY

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DOCKET INFORMATION

224/183

Oracle Corporation, assignee(s) of the application for United States Letters Patent for an improvement in (title) DATA COMMUNICATION PROTOCOLS FOR A MOBILE-BASED CLIENT-SERVER SYSTEM OVER A WIRELESS NETWORK (inventors) Kenneth Harrenstien, Kamal Ahluwalia and David Kucharczyk

☒ executed herewith, or

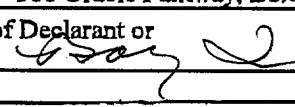
☐ having Serial No. \_\_\_\_\_ filed \_\_\_\_\_, 19\_\_

a copy of the patent application of which is attached hereto, do(es) hereby appoint as attorneys of record with full power of substitution and revocation, to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: Roland N. Smoot, Reg. No. 18,718; Conrad R. Solum, Jr., Reg. No. 20,467; James W. Geriak, Reg. No. 20,233; Robert M. Taylor, Jr., Reg. No. 19,848; Samuel B. Stone, Reg. No. 19,297; Douglas E. Olson, Reg. No. 22,798; Robert E. Lyon, Reg. No. 24,171; Robert C. Weiss, Reg. No. 24,939; Richard E. Lyon, Jr., Reg. No. 26,300; John D. McConaghy, Reg. No. 26,773; William C. Steffin, Reg. No. 26,811; Coe A. Bloomberg, Reg. No. 26,605; J. Donald McCarthy, Reg. No. 25,119; John M. Benassi, Reg. No. 27,483; James H. Shalek, Reg. No. 29,749; Allan W. Janson, Reg. No. 29,035; Robert W. Dickerson, Reg. No. 29,914; Roy L. Anderson, Reg. No. 30,240; David B. Murphy, Reg. No. 31,125; James C. Brooks, Reg. No. 29,898; Jeffrey M. Olson, Reg. No. 30,790; Steven D. Hemminger, Reg. No. 30,755; Jerrold B. Reilly, Reg. No. 32,293; Paul H. Meier, Reg. No. 32,274; John A. Rafter, Jr., Reg. No. 31,653; Kenneth H. Ohriner, Reg. No. 31,646; Mary S. Consalvi, Reg. No. 32,212; Lois M. Kwasigroch, Reg. No. 35,579; Lawrence R. LaPorte, Reg. No. 38,948; Robert C. Laurenson, Reg. No. 34,206; Carol A. Schneider, Reg. No. 34,923; Hope E. Melville, Reg. No. 34,874; Michael J. Wise, Reg. No. 34,047; Richard J. Warburg, Reg. No. 32,327; Jeffrey A. Miller, Reg. No. 35,287; and

David T. Burse Reg. No. 37,104

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I, the undersigned, declare that I am the (an) assignee of the above-identified application or, if the assignee is a corporation, partnership or other association, I am authorized to make this appointment on behalf of the assignee and I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

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	Signature of Declarant or Assignee		Date X 7/8/97
Full Name of Declarant If Other Than Assignee Bobby Truong			
Title of Declarant Patent Counsel			
Address of Declarant Oracle Corporation, 500 Oracle Parkway, Box 649507, Redwood Shores, California 94065			



**DECLARATION  
AND POWER OF ATTORNEY  
Utility Application**

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DOCKET INFORMATION  
**224/183**

As a below named inventor, I hereby declare that: -

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled Data Communication Protocols for a Mobile-Based Client-Server System Over a Wireless Network specification of which

**Check One**

☒ is attached hereto.

☐ was filed on \_\_\_\_\_ as  
Application Serial No. \_\_\_\_\_  
and was amended on \_\_\_\_\_  
(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment(s) referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, § 1.56(a). I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

Application No.	Country	Date of Filing	Priority Yes <input checked="" type="checkbox"/>	Claimed No <input checked="" type="checkbox"/>

## APPLICABLE STATUTES & RULES

### 37 CFR 1.56 DUTY TO DISCLOSE INFORMATION MATERIAL TO PATENTABILITY.

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is cancelled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is cancelled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by ss 1.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

- (1) prior art cited in search reports of a foreign patent office in a counterpart application, and
- (2) the closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.

(b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and

- (1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or
- (2) It refutes, or is inconsistent with, a position the applicant takes in:
  - (i) Opposing an argument of unpatentability relied on by the Office, or
  - (ii) Asserting an argument of patentability.

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

(c) Individuals associated with the filing or prosecution of a patent application within the meaning of this section are:

- (1) Each inventor named in the application;
- (2) Each attorney or agent who prepares or prosecutes the application; and
- (3) Every other person who is substantively involved in the preparation or prosecution of the application and who is associated

with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.

(d) Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.

### 35 U.S.C. 102. CONDITIONS FOR PATENTABILITY. NOVELTY AND LOSS OF RIGHT TO PATENT

A person shall be entitled to a patent unless—

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or
- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or
- (c) he has abandoned the invention, or
- (d) the invention was first patented or caused to be patented, or was the subject of an inventor's certificate, by the applicant or his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application for patent or inventor's certificate filed more than twelve months before the filing of the application in the United States, or
- (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent, or
- (f) he did not himself invent the subject matter sought to be patented, or
- (g) before the applicant's invention thereof the invention was made in this country by another who had not abandoned, suppressed, or concealed it. In determining priority of invention there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other.

### 35 U.S.C. 103. CONDITIONS FOR PATENTABILITY; NON-OBVIOUS SUBJECT MATTER

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Subject matter developed by another person, which qualifies as prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

### 35 U.S.C. 119. BENEFIT OF EARLIER FILING DATE IN FOREIGN COUNTRY; RIGHT OF PRIORITY (Applicable Portion)

An application for patent for an invention filed in this country by any person who has, or whose legal representatives or assigns have, previously regularly filed an application for a patent for the same invention in a foreign country which affords similar privileges in the case of applications filed in the United States or to citizens of the United States, shall have the same effect as the same application would have if filed in this country on the date on which the application for patent for the same invention was first filed in such foreign country, if the application in this country is filed within twelve months from the earliest date on which such foreign application was filed; but no patent shall be granted on any application for a patent for an invention which has been patented or described in a printed publication in any country more than one year before the date of the actual filing of the application in this country, or which had been in public use or on sale in this country more than one year prior to such filing.

### 35 U.S.C. 120. BENEFIT OF EARLIER FILING DATE IN THE UNITED STATES

An application for patent for an invention disclosed in the manner provided by the first paragraph of section 112 of this title in an application previously filed in the United States, or as provided by section 363 of this title, by the same invention shall have the same effect, as to such invention, as though filed on the date of the prior application, if filed before the patenting or abandonment of or termination of proceedings on the first application or on an application similarly entitled to the benefit of the filing date of the first application and if it contains or is amended to contain a specific reference to the earlier filed application.

### 35 U.S.C. 112. SPECIFICATION (Applicable Portion)

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification shall conclude with one or more claims particularly pointing out and distinctive claiming the subject matter which the applicant regards as his invention.

I hereby claim the benefit under Title 35, United States Code, §§ 120 and 365 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

Application No.	Date of Filing	Status-Patented, Pending or Abandoned

**POWER OF ATTORNEY:** As a named inventor, I hereby appoint as my attorneys, with full power of substitution and revocation, to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: Roland N. Smoot, Reg. No. 18,718; Conrad R. Solum, Jr., Reg. No. 20,467; James W. Geriak, Reg. No. 20,233; Robert M. Taylor, Jr., Reg. No. 19,848; Samuel B. Stone, Reg. No. 19,297; Douglas E. Olson, Reg. No. 22,798; Robert E. Lyon, Reg. No. 24,171; Robert C. Weiss, Reg. No. 24,939; Richard E. Lyon, Jr., Reg. No. 26,300; John D. McConaghy, Reg. No. 26,773; William C. Steffin, Reg. No. 26,811; Coe A. Bloomberg, Reg. No. 26,605; J. Donald McCarthy, Reg. No. 25,119; John M. Benassi, Reg. No. 27,483; James H. Shalek, Reg. No. 29,749; Allan W. Jansen, Reg. No. 29,035; Robert W. Dickerson, Reg. No. 29,914; Roy L. Anderson, Reg. No. 30,240; David B. Murphy, Reg. No. 31,125; James C. Brooks, Reg. No. 29,898; Jeffrey M. Olson, Reg. No. 30,790; Steven D. Hemminger, Reg. No. 30,755; Jerrold B. Reilly, Reg. No. 32,293; Paul H. Meier, Reg. No. 32,274; John A. Rafter, Jr., Reg. No. 31,653; Kenneth H. Ohriner, Reg. No. 31,646; Mary S. Consalvi, Reg. No. 32,212; Lois M. Kwasigroch, Reg. No. 35,579; Lawrence R. LaPorte, Reg. No. 38,948; Robert C. Laurenson, Reg. No. 34,206; Carol A. Schneider, Reg. No. 34,923; Hope E. Melville, Reg. No. 34,874; Michael J. Wise, Reg. No. 34,047; Richard J. Warburg, Reg. No. 32,327; Jeffrey A. Miller, Reg. No. 35,287; and

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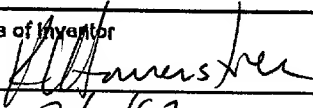
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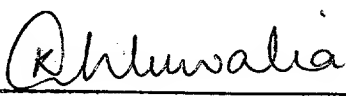
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I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

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Date	7/2/97

202	
Date	7-1-97

Signature of Inventor 203	
Date	7/8/97

Signature of Inventor 204	
Date	

(Signatures should conform to names as presented at 201 et seq. above.)